

### Recitation of the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Claims 1-35 (cancelled)

36. (New) A method for generating of at least one non-naturally occurring variant protein with at least one desired characteristic relative to a target protein comprising:

- a) inputting the coordinates of said target protein into a computer;
- b) identifying a list of variable residue positions in said target protein;
- c) applying a force field calculation to said variable residue positions to generate a set of amino acid residues at each of said variable positions to generate primary library comprising optimized variant protein sequences;
- d) recombining non-variable and variable residue positions to generate a secondary library of protein sequences, wherein the set of amino acids at each of said variable residue positions is used to generate the library of protein sequences, and wherein at least one member of said secondary library is not found in said primary library;
- f) synthesizing a plurality of said secondary library protein sequences and screening said sequences to identify at least one non-naturally occurring variant protein with at least one desired characteristic.

37. (New) A method according to claim 36, wherein said force field calculation is a Self-Consistent Mean Field (SCMF) calculation.

38. (New) A method according to claim 36 wherein said recombining comprises:

- a) generating a set of oligonucleotide probes each encoding at least one of said amino acid residues at said variant positions;
- b) using said probes in a polymerase chain reaction (PCR) to generate a plurality of oligonucleotide sequences, each encoding said secondary variant sequences; and
- c) producing said secondary variant sequences in host cells transformed with said oligonucleotide sequences.

39. (New) A method according to claim 38 wherein said PCR is multiple PCR wherein said probes are pooled.

40. (New) A method according to 39 wherein said probes are added in equimolar amounts.

41. (New) A method according to claim 39 wherein said probes are combined in amounts that correspond to the frequency of the said amino acid residues at said variant positions in said secondary library.